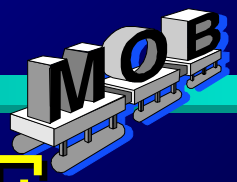
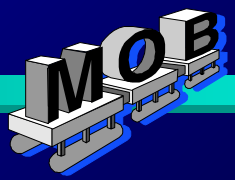


MOBILE OFFSHORE BASE (MOB)

ONR S&T Program Overview

Office of Naval Research

ONR MOB S&T Program



- **Follows DARPA Program (1993-1996)**
- **ONR S&T Program (1997-2000)**

  Objective:
  Establish Feasibility and Cost of MOB

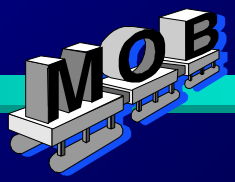
  Approach:

  ①*Open, Collaborative Teaming among Industry, Academia, and Government*

  ②*Data and Technical Documents immediately available on the WEB **

* *http://mob.nfesc.navy.mil*

MOB General Mission

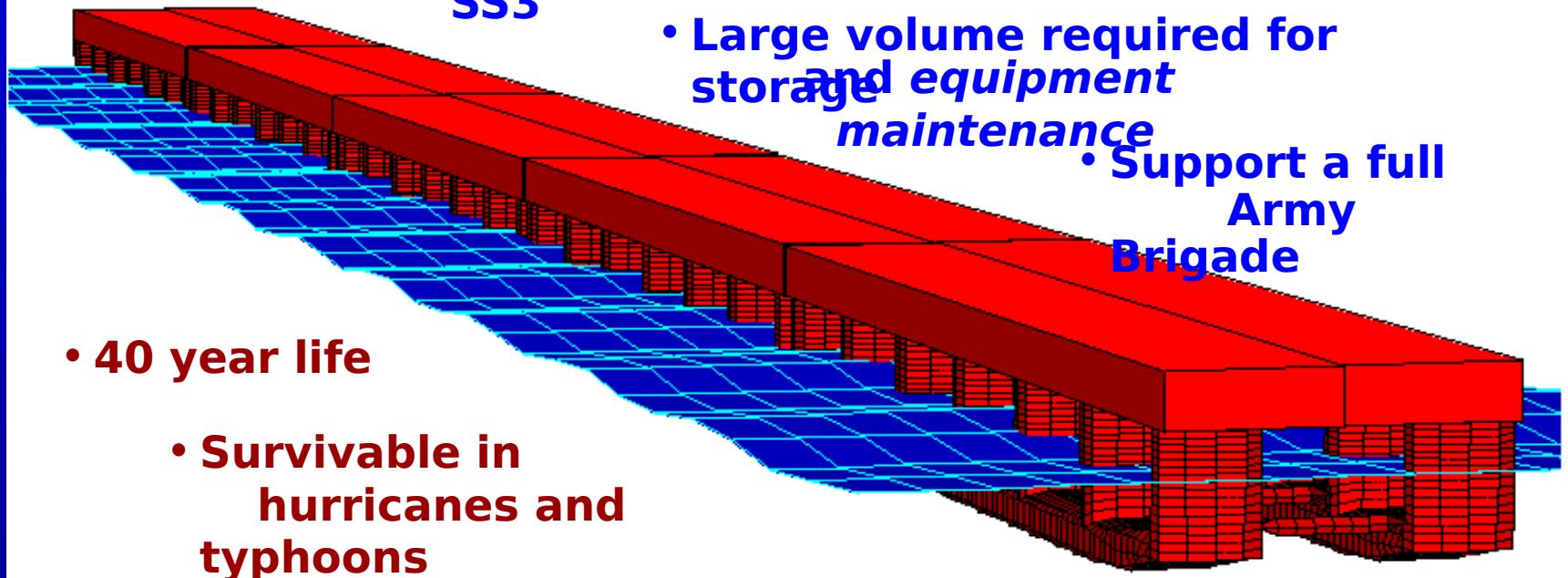


- **Provide a floating, in-theater platform for U.S. and Allied Forces for operational and sustainment basing capabilities in support of:**
  - *Flight Operations*
  - *Ground Troops*
  - *Equipment Storage*
  - *Supply & Maintenance*
  - *Fleet Operations*

A Unique Ocean Mega-Structure

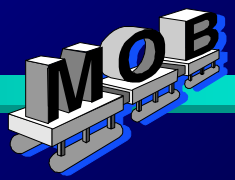
MOB

- Support fixed wing cargo aircraft operations up to SS6
- Ship-to-ship cargo transfer up to SS3
- Large volume required for storage and *equipment maintenance*
- Support a full Army Brigade



- 40 year life
- Survivable in hurricanes and typhoons
- *Reconfigurable versus mission*
- *Exceeds Industry Practice*

MOB Module & Platform Size



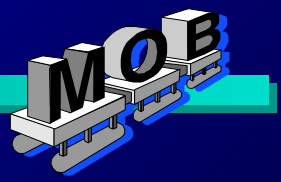
Semisubmersible Modules

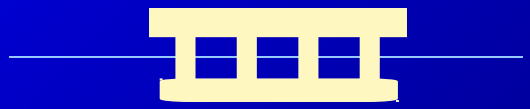
300-600m length
130-160m beam
13-35m draft

Platform Configuration

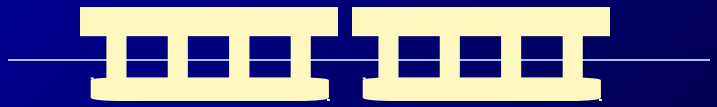
300-1800m length
1 to 5 modules
Rigid/Hinged/Bridged/DP Connectivity

Concept Configurations



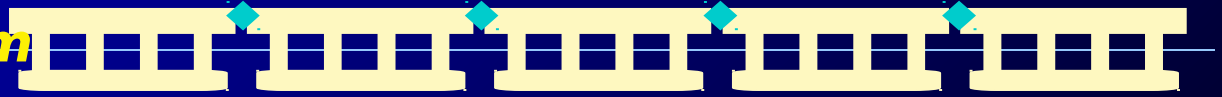


Single Module

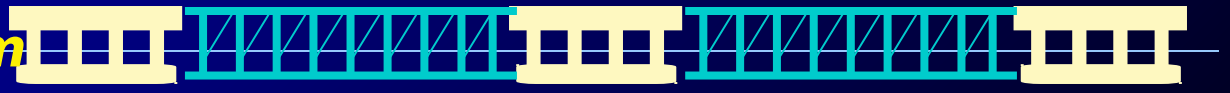


Two Modules

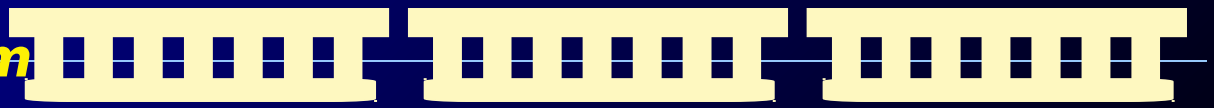
Hinged Platform



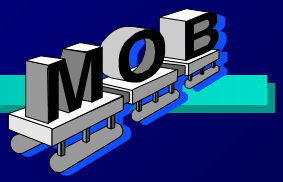
Bridged Platform



Dyn. Pos. Platform

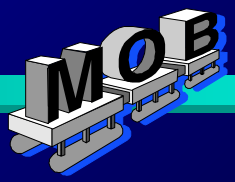


MOB Topics Related to JLOTS



- Requirements Derivation
- Operational Availability Modeling
- Cargo Transfer
- Constructability

Requirements Derivation Process



Mission Needs Statement (MNS)

CONOPS

Requirements

Functions

Mission Analysis

Requirement Analysis

Functional Analysis

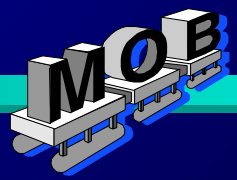
Synthesis & Concepts

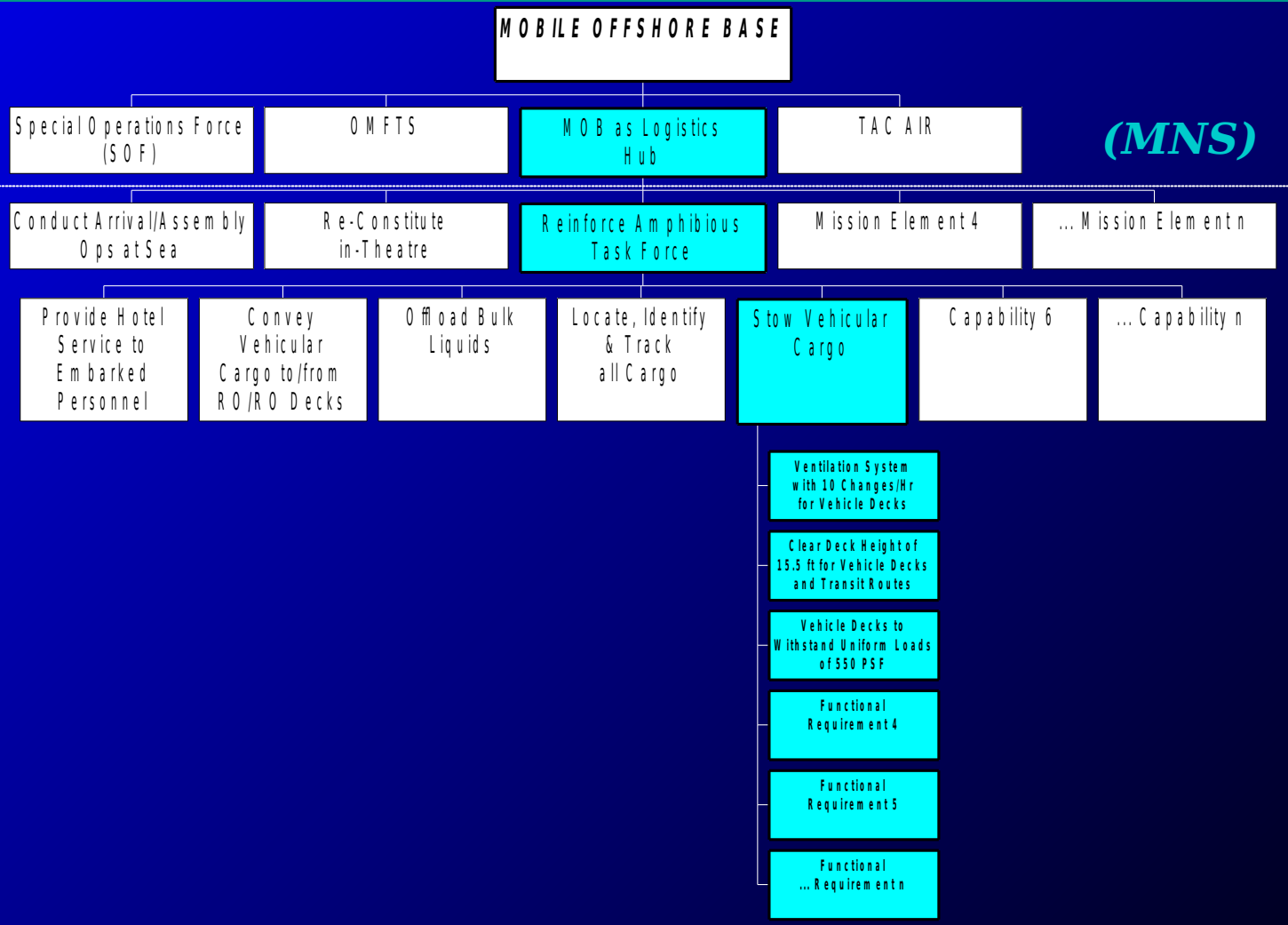
Broadly Stated Objectives Decomposed into Specific Engineering Design Requirement

Functional RequirementsDATABASE

Engineering Design Criteria

Requirements Derivation Process Documented in Database Structure




MOBILE OFFSHORE BASE
Special Operations Force (SOF)
OMFTS
MOB as Logistics Hub
TAC AIR
(MNS)
Conduct Arrival/Assembly Ops at Sea
Re-Constitute in-Theatre
Reinforce Amphibious Task Force
Mission Element 4
... Mission Element n
(CONOPS)
Provide Hotel Service to Embarked Personnel
Convey Vehicular Cargo to/from RO/RO Decks
Offload Bulk Liquids
Locate, Identify & Track all Cargo
Stow Vehicular Cargo
Capability 6
... Capability n
(SCD)
Ventilation System with 10 Changes/Hr for Vehicle Decks
Clear Deck Height of 15.5 ft for Vehicle Decks and Transit Routes
Vehicle Decks to Withstand Uniform Loads of 550 PSF
Functional Requirement 4
Functional Requirement 5
Functional ... Requirement n

Contents of Requirements Database

Notional MOB System Capabilities to Support - Operational Maneuver From The Sea (OMFTS)

Supply and Sustainment

Receive, store, issue, and re-supply material for MAGTF operations for 60 days, Interface with Strategic Sea-lift and Air-Lift

Maintenance

I-Level for all MAGTF Aircraft, Vehicles and Combatant Craft

C4I

Control MAGTF throughout Area of Operation (AO), Coordinate with CJTF supporting forces

Health Service Support

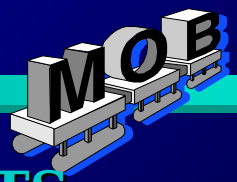
Routine and emergency medical care

Other

Administrative and personnel support to keep combat forces fully operational

EXAMPL

Major Mission Specific Capabilities



Logistics (CVBG)

- Daily Cargo Through-put in support per CVBG
  - Provision/Store
    - » 24 Metric Tons
  - DFM
    - » 580,000 Liters
  - JP5
    - » 1 Million Liters
  - Ordnance
    - » 150 Metric Tons

SOF

- Up to 10,000 SOF personnel
- 74 Rotary/Fixed-wing aircraft, 22 combatant craft

Water

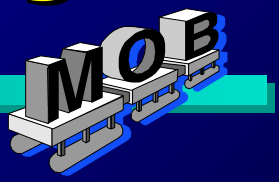
- 6 Million Liters
- Fuel & Dry Cargo for SOF equipment
  - 40.5 Million Liters
  - 9,700 Metric Tons Cargo

OMFTS

- Up to 20,000 MAGTF personnel
- 128 Rotary/Fixed-wing aircraft, 62 lighterage
- Strategic Sealift and Airlift (C-17 capable)
- Water
  - 24 Million Liters
- Fuel & Dry Cargo for MAGTF equipment
  - 67.5 Million Liters
  - 16,200 Metric Tons Cargo

EXAMPLE

Mob Size & Cost Ranges



SOF *$1.5B*

OMFTS *$2-3.0B*

LOGISTICS *$2-3.0B*

OPERATIONAL BASE *$4-5.0B*

C-130 Capability

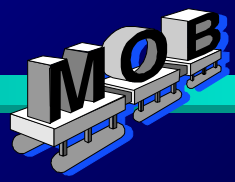
C-17 Capability *$8.0B*

1,000 2,000 3,000 4,000 5,000 6,000

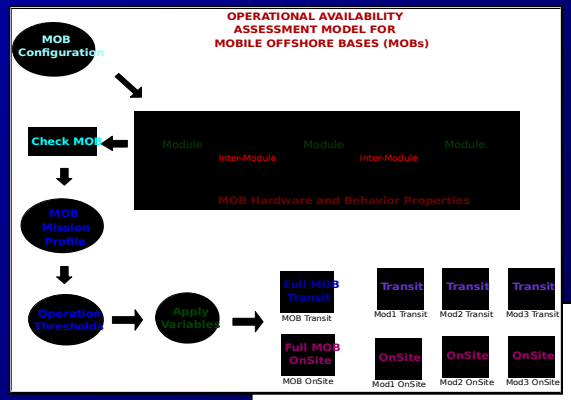
RISK: ACCEPTABLE PENDING COMPLETION OF S&T

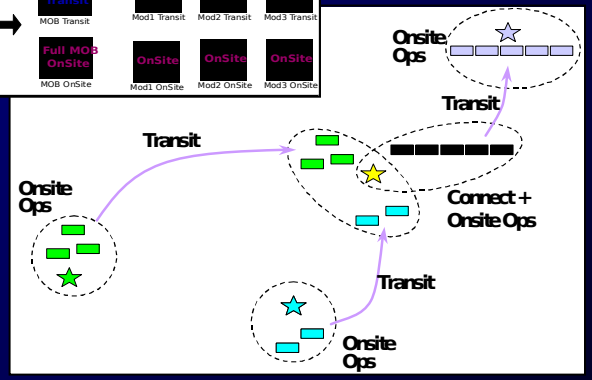
PLATFORM LENGTH (FT)

Operational Availability Model



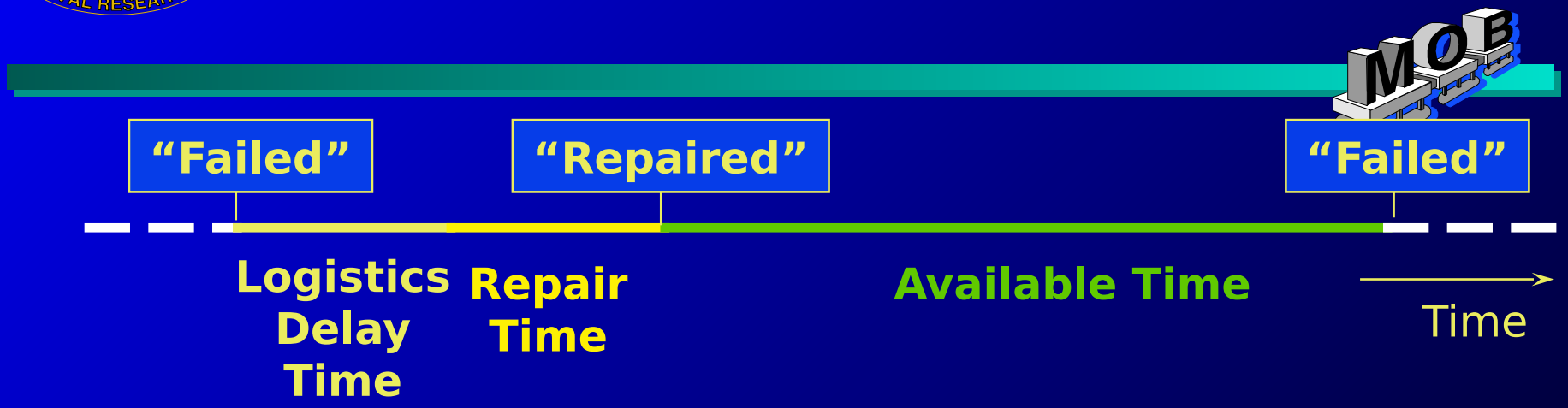
- Assess the performance of any MOB concept relative to the Mission Needs Statement
- Investigate the sensitivity of various performance parameters to changes in Concept Configuration and Mission Requirements





- Status:
  - Preliminary model - Sept. 98
  - Generalized model & Report Dec. 99
  - Input Data files - Feb. 00

What is Ao?

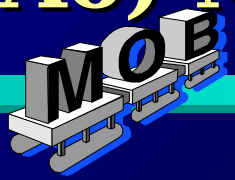


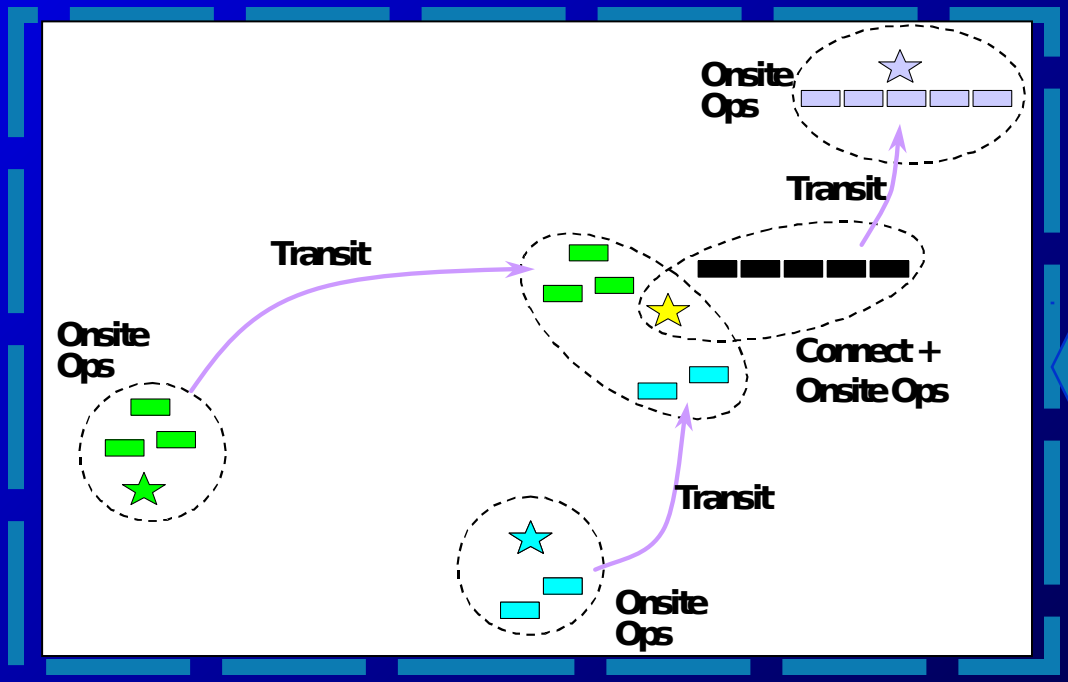
$$Ao = \frac{\text{Available Time}}{\text{Total Time}}$$

Reliability → **Available Time**

Maintainability → **Repair Time**

Operational Availability (Ao) Mo



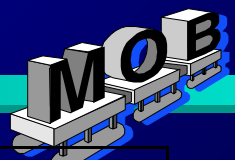


Wind/wave/current Databases

- Large-scale
- Typhoon scale

- Quantify performance versus
  - Platform configuration,
  - Metocean characteristics of various sites,
  - Mission Requirements

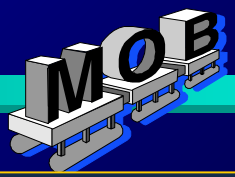
Preliminary Ao Statistics - Site Comparison



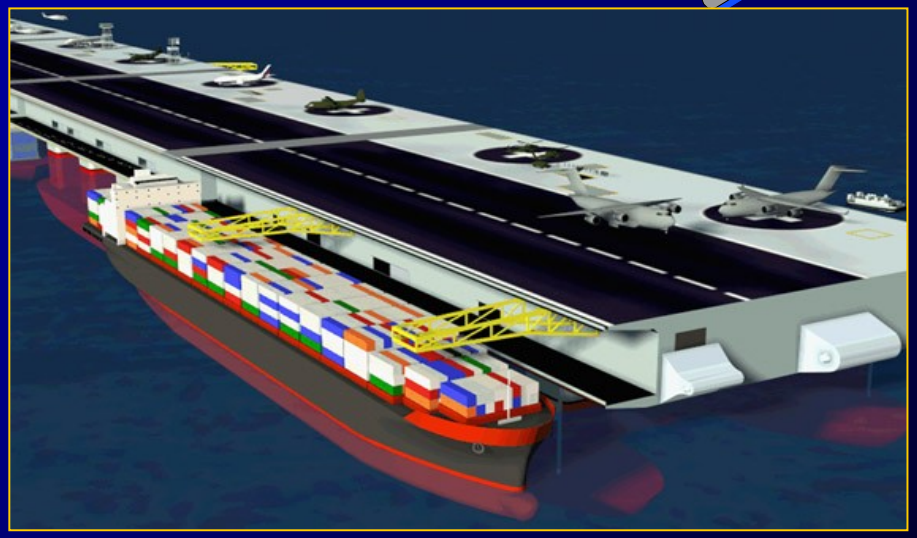
Site	Capability	Ao	MTBF	MTTR
North Atlantic	Air Ops	0.9662	343.1	12.0
	Sea Ops	0.5131	73.2	70.0
	Stationkpg	0.9986	1086.0	1.5
Western Pacific	Air Ops	0.9903	957.3	9.4
	Sea Ops	0.8676	296.0	45.2
	Stationkpg	0.9975	1239.8	3.1
Arabian Sea	Air Ops	0.9993	1580.7	1.1
	Sea Ops	0.9048	715.6	75.3
	Stationkpg	0.9993	1580.7	1.1
Sea of Japan	Air Ops	0.9966	912.7	3.1
	Sea Ops	0.9476	402.1	22.2
	Stationkpg	0.9987	1086.7	1.4

(Hours

Ship Cargo Transfer Rate Model

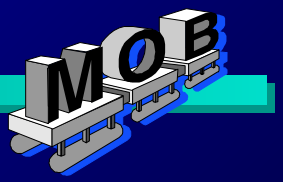


- **Create an analytically robust method to estimate cargo transfer rate between MOB and auxiliary vessels under variety of environmental conditions**



- Status
  - Preliminary Model and Interem Report delivered - March 99
  - Ship Motion analysis completed - Aug 99
  - Final Model and Report due March 00

Overall Modeling Strategy



Vessel Response

Environment

Motion Calcs

Transfer Simulation

Rate

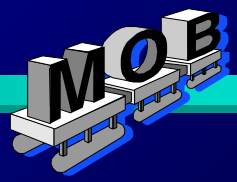
Xfer Schedule

Cargo Xfer Method

Cargo Description

Cargo Movement Plans

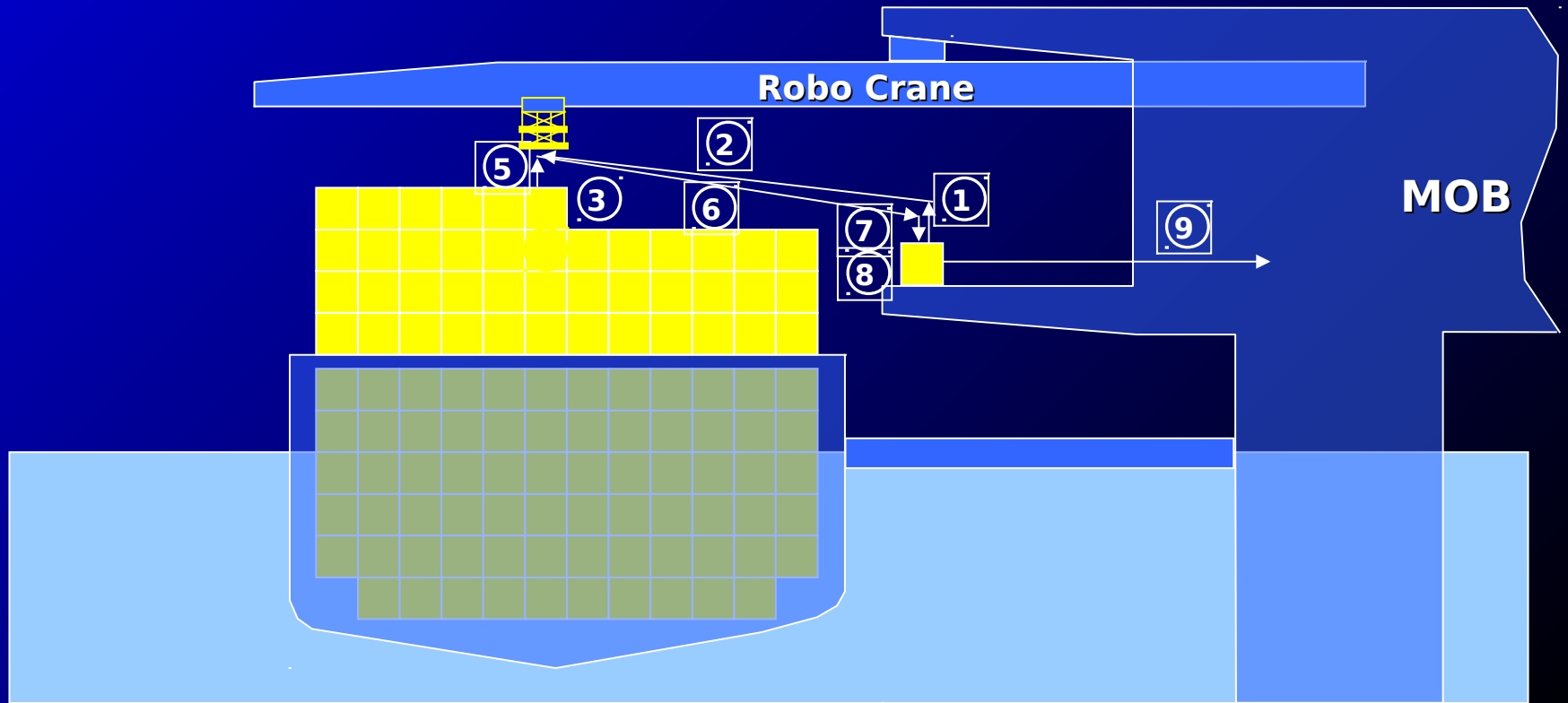
Container Movement Steps



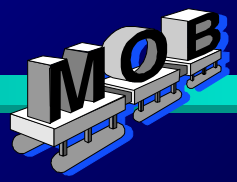
Movement Steps

1. Lift to travel position
2. Move to target
3. Focus on target*
   Insert in Cell Guide*
   Lower in Cell Guide*
4. Latch
   Lift in Cell Guide*
5. Lift to travel position
6. Move to unload
7. Drop to unload
8. Unlatch
9. Store on MOB

(*Gated operation)

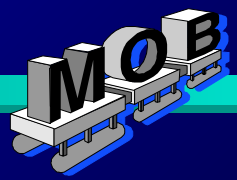


Cargo Transfer Rate Model Conclusions



- Simulation works as tool for determining transfer rate
- Preliminary results
  - Expect about 29 containers / hr as maximum transfer rate on MOB
  - Motion compensated crane design is likely choice for MOB, with manual backup capability
  - Capability of crane designs to acquire target should be focus of crane-testing programs
- Model needs to be calibrated from field test data

Cargo Transfer to Landing Craft



Focus: Assess ability to transfer cargo to small landing craft alongside MOB

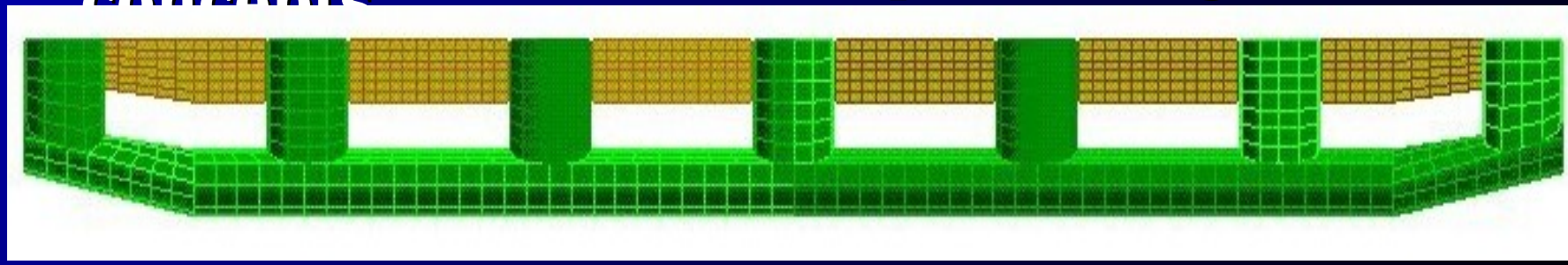
Products:

- wave characterization around MOB
- wave sheltering concepts

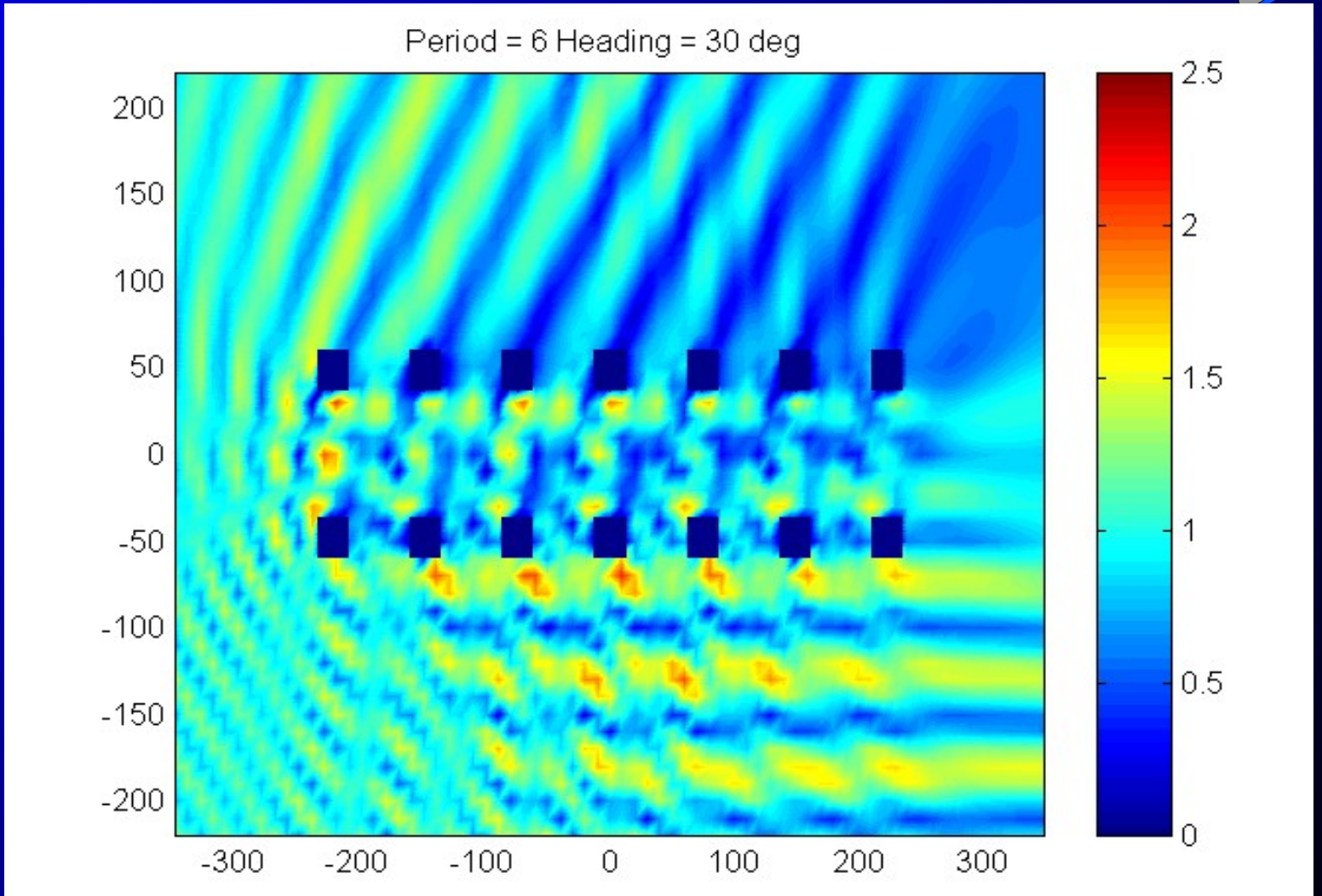
Issues:

- size of MOB allows for unique open sea cargo concepts
- MOB does not move -good
- large hull amplifies waves - bad
- physics of vessel to vessel interaction poorly understood
- wall sheltering

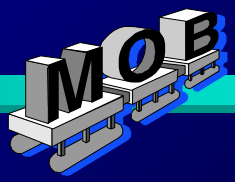
Vertical



Typical Relative Water Surface Contour Plot
Base Case – 6 Second Waves - 30° Heading



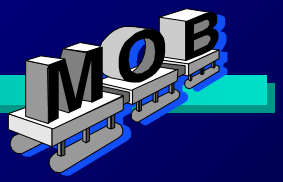
Comparison of RMS Ramp Angle
(Heading With Lowest Motions)



Peak Period (sec)	Base Case Location 4, 20°	Vertical Walls Location 4, 70°
6	2.57	1.54
8	3.82	1.90
10	4.46	2.36

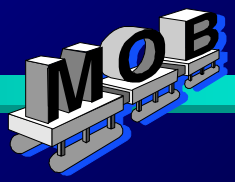
Transmission Coeff
Is Misleading - Must Calculate Vessel Motions

Constructability



- **Concluded that U.S. industry has capacity to competitively deliver a CTOL-length MOB platform**
  - ***Developed a risk-based constructability model and guidelines***
    - **facility capabilities**
    - **transportation**
    - **environmental impact**
    - **safety**
    - **management**
    - **cost and scheduling**

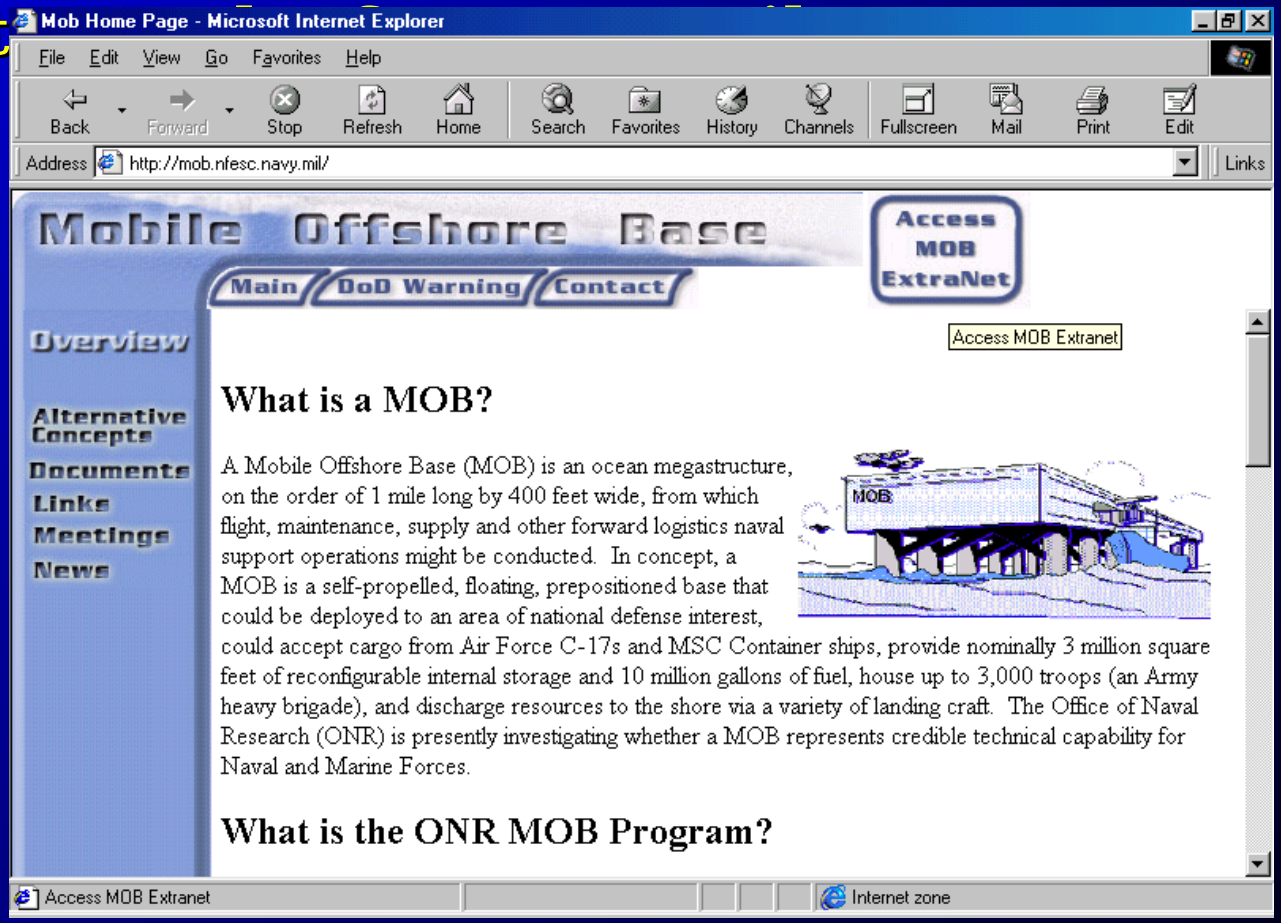
MOB Program Summary



- Pioneering marine technology advancements
- Products emphasize general applicability, ranging from mission planning to fabrication
- Advancements also applicable to other maritime structures and Navy programs
- Some S&T unfinished due to short 3-year project duration

For More Information

- Visit the MOB WEB Site:
  htt


Mob Home Page - Microsoft Internet Explorer
File Edit View Go Favorites Help
Back Forward Stop Refresh Home Search Favorites History Channels Fullscreen Mail Print Edit
Address http://mob.nfesc.navy.mil/
Links
Mobile Offshore Base
Access MOB ExtraNet
Main DoD Warning Contact
Overview
Alternative Concepts
Documents
Links
Meetings
News
Access MOB Extranet
What is a MOB?
A Mobile Offshore Base (MOB) is an ocean megastructure, on the order of 1 mile long by 400 feet wide, from which flight, maintenance, supply and other forward logistics naval support operations might be conducted. In concept, a MOB is a self-propelled, floating, prepositioned base that could be deployed to an area of national defense interest, could accept cargo from Air Force C-17s and MSC Container ships, provide nominally 3 million square feet of reconfigurable internal storage and 10 million gallons of fuel, house up to 3,000 troops (an Army heavy brigade), and discharge resources to the shore via a variety of landing craft. The Office of Naval Research (ONR) is presently investigating whether a MOB represents credible technical capability for Naval and Marine Forces.
MOB
What is the ONR MOB Program?
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